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ABSTRACT:

PURPOSE: To realize an electron wave interference effect so as to enable a semiconductor to be easily manufactured by a method wherein N-type semiconductor regions disposed at intervals of electron de Broglie wavelengths are formed just under a gate electrode on the surface of a carrier feed layer, the length of the gate electrode in a source-drain direction is set smaller than an electron inelastic scattering length, and a Schottky electrode is formed on the rear side of a semiconductor substrate.

CONSTITUTION: A Schottky electrode (back gate electrode) 8 is formed on the rear side of a non-doped GaAs substrate 1 through evaporation. A source electrode 6S and a drain electrode 6D are formed on an N-type GaAs layer 5 through evaporation and subjected to an alloy treatment so as to come into ohmic contact with external leads. A region of the N-type GaAs layer 5 surrounded with the source electrode 6S and the drain electrode 6D is partially removed through an electron beam lithography method to form a stripe pattern where N-type GaAs fine wires which are 300Å or so in width, disposed at intervals of 300Å or so, and whose longitudinal direction extends in a source-drain direction. Gage electrodes (Schottky electrodes) 7 500Å or so in gate length are formed on a stripe pattern composed of N-type GaAs fine lines through an EB lithography method.

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